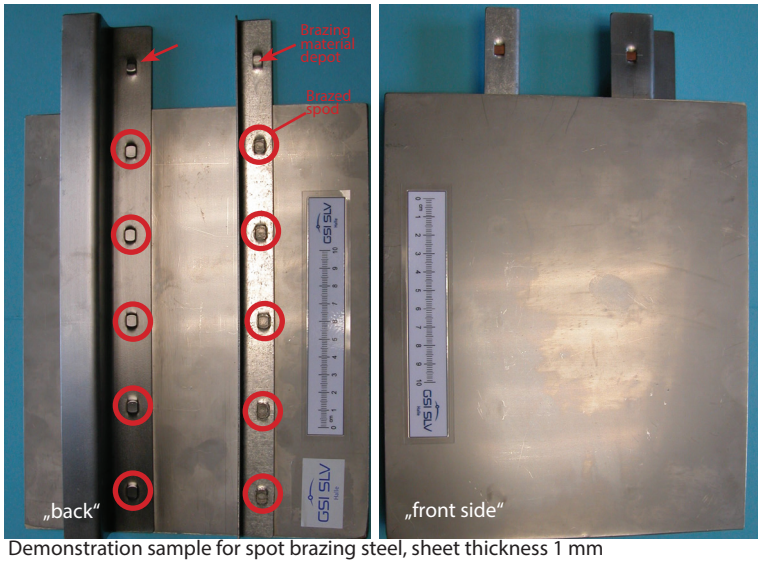
Spot Brazing

A new process for non-visual lap joints

The alternative to spot welding



Demonstration sample for spot brazing steel, sheet thickness 1 mm

State of technique

Lap joints are preferred for joining thin sheets in a thickness interval near 1 mm. Besides strength requirements a good surface appearance very often is wanted. In some cases one side „non-visuality" is expected. There is a big variety of used processes reaching from arc welding processes over some resistance welding processes and adhesive bonding to mechanical joining processes as punch riveting or clinching. The only one process that can produce really non-visual joints is adhesive bonding, but it has other disadvantages. All joints produced using other processes require an after joining processing, if non-visual joints are wished.
Using aluminium sheets the problems in resistance welding will increase by
extreme low electrode life
very expensive welding machines (force program, DC, very high current)

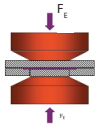
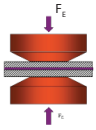
Aims

Produce nearly non-visual lap joints
Avoid post joining processes
Use simple spot welding machines

Procedure steps

The first step is producing one or several depots of brazing material fixed on one of the parts to be joined. After that will follow the steps which also will be applied in resistance spot welding - „position the parts" and „produce the joint" to a later time and/or at another place. Under industrial condition this procedure is today only suited for steel. To do also spot brazing using aluminium we recommend a modified procedure using braze-clad aluminium sheets. A detailed information you'll get on our paper „Resistance spot brazing aluminium".

Resistance spot brazing of steel or aluminium (schematic)

Procedure steps	Depot of brazing material is produced	
	mechanically (Cu, partial)	by roll cladding (AlSi on the whole area)
	Steel	**Aluminium**
Produce a depot of brazing material		
Position the parts		
Produce the spot (resistance heating)		

Equipment

The brazing process is carried out using normal spot welding machines (DC-machines without current and force program) in a time corresponding to that for spot welding. A modified clinching process is used for cutting and fixing the brazing material. A low price unit for this process is available as a prototype.

Possibilities of application

Car body production (secondary visual areas)
Stiffening of big sheet parts, e. g. for railway applications
At first the process was applied on centrifuge chambers, today it is three years in production.

Sheet thickness and depot dimensions

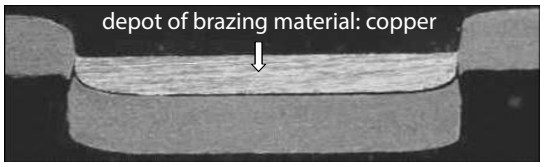
Brazing material depot		Sheet thickness (mm)					
Geometry	Dimension	0,8	1	1,5	2	2,5	3
square	5 x5	■	■	■			
	7 x 7			■	■	■	
	9 x 9					■	■
rectangular	2,5 x 10	■	■	■			
	5,5 x15			■	■	■	■

Dimensions of brazing material depots were oriented on recommendations for spot diameter in resistance spot welding. Today there are available three square types of tools optimized for 1, 2 and 3 mm sheet thickness. Furthermore two rectangular type tools have been developed for minimizing width of lap.

Strength behaviour

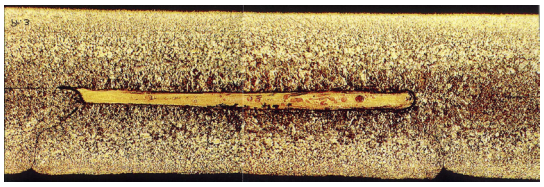
Static shear strength is nearly the same as in resistance spot welding.
The fatigue strength tested on steel sheets of 1 mm thickness was 50 percent higher as on resistance welded samples.

Metallographic samples

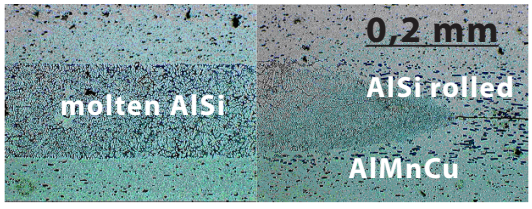


Depot of brazing material, dimensions
5 x 5 mm

Steel



Spot brazed steel
DC01; t = 1,0 mm



Aluminium

Spot brazed joint

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Contact

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